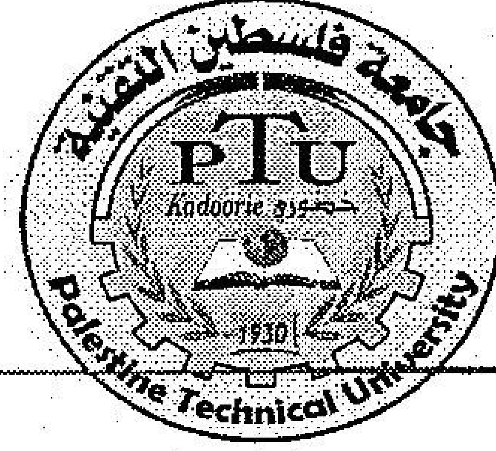
اقتصاد هندسي - امتحان أول - دكتور سامر البنا

السلطة الوطنية الفلسطينية
جامعة فلسطين التقنية طولكرم"خضوري"
امتحانات العام الدراسي 2013/2012
الفصل الدراسي الاول



التخصص والمستوى :
اسم المساق : اقتصاد هندسي
تاريخ الامتحان : 2012/11/26
زمن الامتحان : 50 دقيقة

الاسم : [redacted] الشعبة : ____________

Questions

Q1. British Airways estimates that unpainted airplanes use less fuel because of less weight to the extent of $15,000 per year per plane. How much could the company afford to spend NOW to remove the paint from an airplane if it expects to recover its investment in 6 years at i = 10%. (4 marks)

Q2. Special insulation roofing material can be installed on parts of a warehouse for $5,000. If the company expects to recover its investment in 5 years through reduced energy costs, how much is the required annual savings at i = 10% per year? (4 marks)

Q3. The management of a sensor producing company is studying producing a new irrigation sensor. If the following estimates are used:

- Cost of development is $12,000 every year for the first 4 years.
- Profit of $10,000 is expected at year 5 when the new sensor are first sold
- The profit is expected to increase at constant rate until it reaches $20,000 at year 10.
- The product will be discontinued afterwards due to expected emergence of new technologies.
- The company expected a rate of return of 12%

As the company engineer, who are required to present the management with:

- A cash flow of the whole project (3 marks)
- The present net value of the project (12 marks)
- A comment about your opinion of the project economically (2 marks)

Good luck

تم الرفع بواسطة
م. مؤمن أبو عيسى

Engineering Economy

	Find	From	Equation	No.
Single Payment	F	P	$F = P(1+i)^n$	2.2
	P	F	$P = F/(1+i)^n$	2.3
Equal-Payment Series	P	A	$P = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$	2.6
	A	P	$A = P\left[\frac{i(1+i)^n}{(1+i)^n - 1}\right]$	2.7
	F	A	$F = A\left[\frac{(1+i)^n - 1}{i}\right]$	2.8
	A	F	$A = F\left[\frac{i}{(1+i)^n - 1}\right]$	2.9
Gradient Series (arithmetic)	P	G	$\frac{G}{i}\left[\frac{(1+i)^n - 1}{i(1+i)^n} - \frac{n}{(1+i)^n}\right]$	2.15
	A	G	$G\left[\frac{1}{i} - \frac{n}{(1+i)^n - 1}\right]$	2.17
	F	G	$G\left[\left(\frac{1}{i}\right)\left(\frac{(1+i)^n - 1}{i} - n\right)\right]$	
Gradient Series (geometric)	P	A_1	$A_1\left[\frac{1-\left(\frac{1+g}{1+i}\right)^n}{i-g}\right]$	2.23 $i \neq g$
	P	A_1	$A_1\left[\frac{n}{1+i}\right]$	2.24 $i = g$
Breakeven	Profit = R-(FC+VC) =(r-v)Q-FC			

$36047.6\left[\frac{0.12}{0.7623}\right]$

5674.24

$5674.24\left[\frac{0.76234}{0.21148}\right]$

$\frac{2.1058}{0.3727}$

26/11/2012

Answers

21/25

[redacted]

اقصاد، ممتاز

[redacted]

Q1

$i = 10\%$

Time line: 0 1 2 3 4 5 6 ; $P = ??$; $A = 15000$

$$P = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$$

$$= 15000\left[\frac{(1.1)^6 - 1}{0.1(1.1)^n}\right]$$

$$= 15000\left[\frac{1.771561 - 1}{0.1771561}\right] =$$

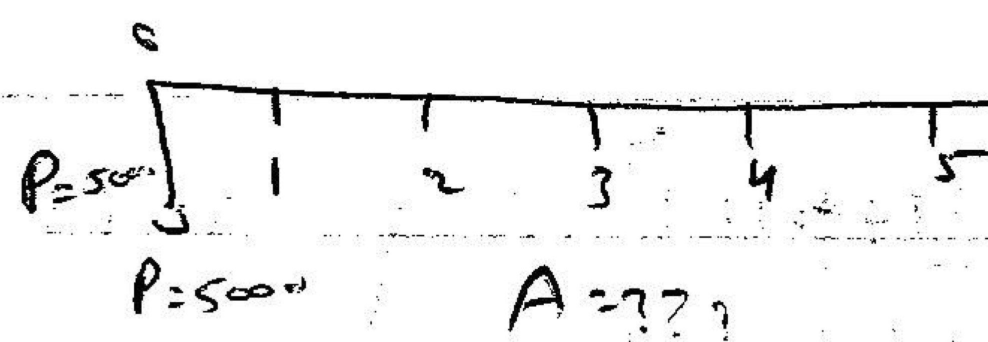
$$= 15000\left[4.35526\right] = 65328.91\ \$$$

P total = 15000 + P after 6 years.

(4) ✓

Now 65328.91 + 15000 = 80328.91 total (P)

Q2



$A/P =$

$$A = P\left[\frac{i(1+i)^n}{(1+i)^n - 1}\right]$$

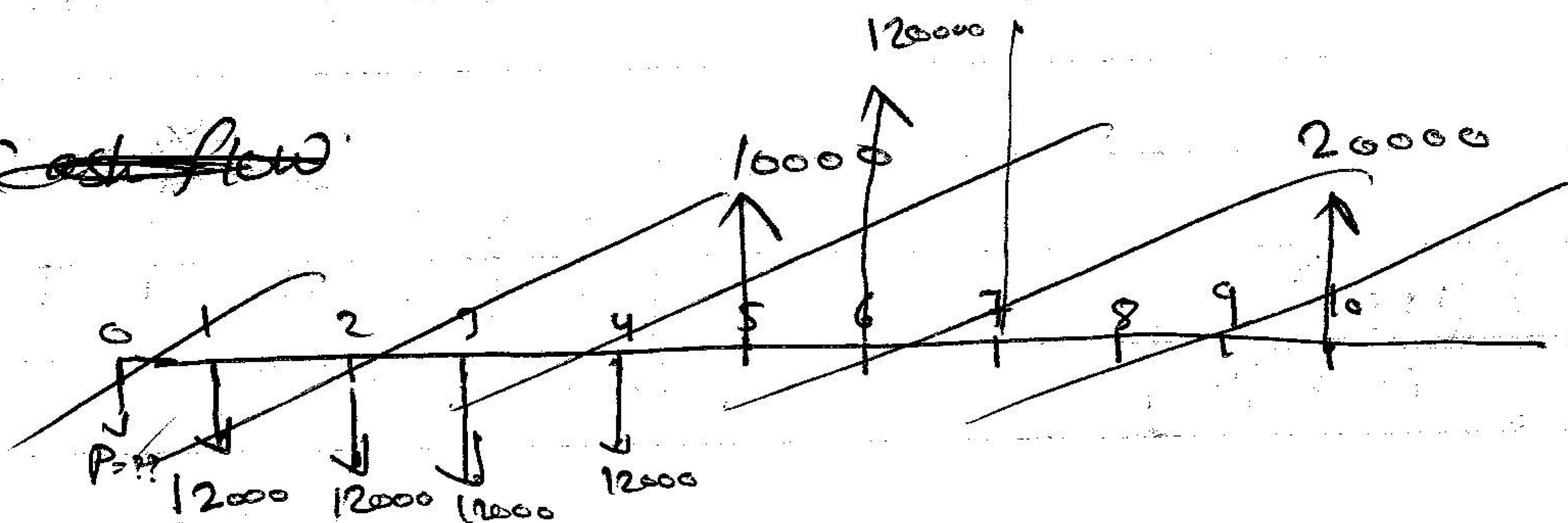
(4)

$$= 5000\left[\frac{0.1(1.1)^5}{(1.1)^5 - 1}\right] = 5000\left[\frac{0.161051}{0.61051}\right]$$

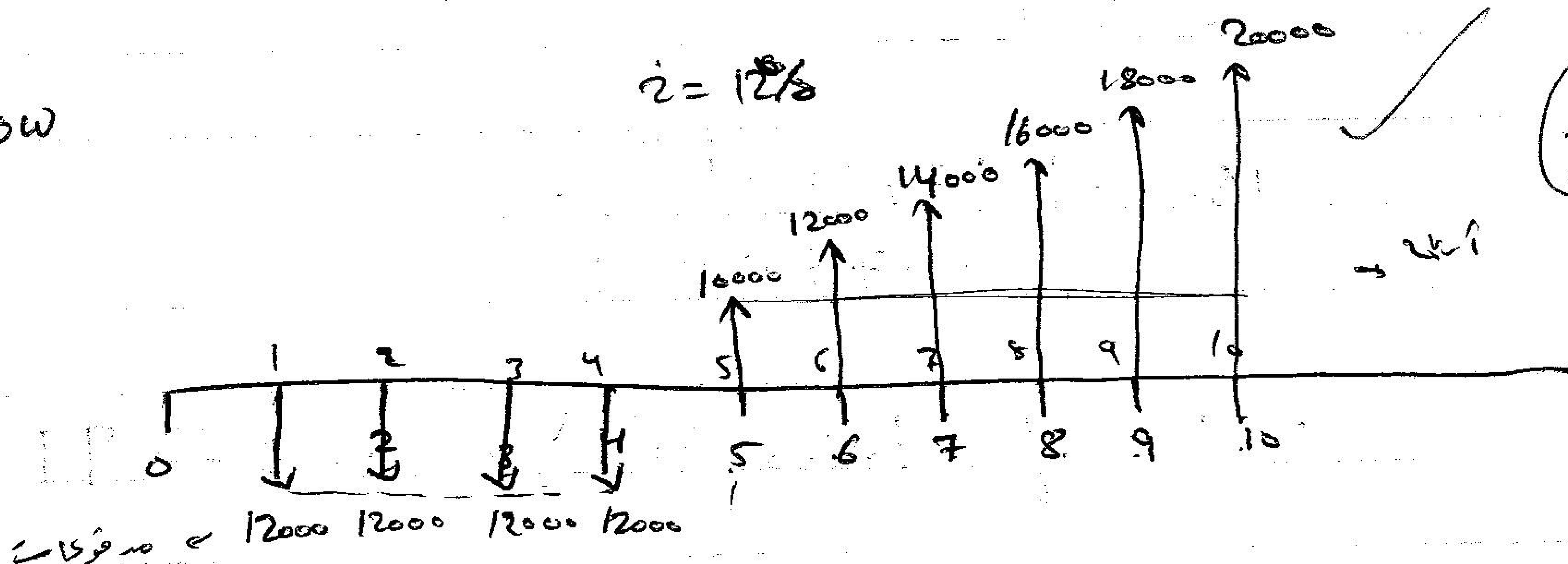
$$= 5000\left[0.26379748\right]$$

$$A = 1318.98\ \$$$ ✓

Q3



Cash flow



(3)

The present value for the costs =

$$12000\left[\frac{(1+0.12)^4-1}{0.12(1+0.12)^4}\right] = 12000\left[\frac{0.57352}{0.18882}\right]$$

$$= 12000\,[3.0373] = \boxed{36448.2}$$

The present valu for profit — نقسم الـ شغلتين

$A = 10000$

$$= 10000\left[\frac{(1.12)^{5\,(6)}-1}{0.12\,(1.12)^{5\,(6)}}\right] = 10000\left[\frac{0.76234}{0.21148}\right]$$

$$= 10000\,[3.6047]$$

$$\boxed{= 36047.6}$$

الآن نرجع الى سنة صفر ونعتبرها ~~P~~ حيث نعتبر F

$$P_0 = \frac{36047.6}{(1+0.12)^5} = \frac{36047.6}{1.7623} = 20454.37$$

based on mistake that $n=5$ n must be 6

~~$36047.6 \left[\frac{0.12}{(1+i)^n - 1}\right]$~~

$$P_{total} = 20454.37 + 36047.6 = 56501.97 \text{ \$}$$

from gradient $G = 2000$

$$P/G = \frac{2000}{0.12}\left[\frac{(1.12)^{5}-1}{0.12(1.12)^{5}} - \frac{5}{(1.12)^{5}}\right]$$

(6)

$$16666.67\left[\frac{0.76234}{0.21148} - 2.8371\right]$$

8

$$= 16666.67\,[0.76768]$$

إيش تغير المسألة ← $= 12794.75$

$F = 12794.75$

Find $P/F = \frac{12794.75}{1.76234} = 7260.1$

$$P_{total} \text{ from } G = 7260.1 + 12794.75$$

20454.37

$+ A_{10000}$

$= 20054.8$

P_{1000} @ yr 0 + P_G @ yr 0 ← 20054.8 + 56501.97

$P = 40108.57$

P final = 40108.57

36448.2

The project is good because P of profit = A is ~~[illegible]~~ big more than the P of costs

2